# CARLO GAVAZZI
## Automation Components

**CARLO GAVAZZI**

## PD30 series - Photoelectric Sensors

# Sensors

# PD30 Series
## Miniature photoelectric sensors

This new range of miniature high-performance sensors comes in three complete product lines: a PD30 STAINLESS STEEL family with IP69K and Ecolab certifications and superior durability, a cost-effective PD30 BASIC and *POINTSPOT* family with potentiometer adjustment and a refined PD30 ADVANCED family with teach-in function, dust warning, and options for muting and remote teaching.

The PD30 sensor family combines excellent sensing abilities with an optimised compact housing design. Featuring a size of only 10.8 x 20 x 30 mm, it follows international industry standards. In addition, the PD30 family covers a wide variety of sensing principles to fit requirements of virtually any application: diffuse-reflective, background suppression, retro-reflective with or without polarization, even for transparent objects, as well as through-beam. These PD30 sensors are eminently suited for applications where space saving and high accuracy in detection are of vital importance.

## Full range of PD30 sensors

### World-class housing design
The compact and robust sensor housing in ABS-PMMA offers a high level of water and dust protection (IP 67). The Stainless steel version is IP69K and Ecolab certified.

### High EMC performance
The microprocessor technology and the compact design ensure excellent EMC performance.

### Environmentally friendly
This lead-free sensor is designed according to the RoHS directive. The highly advanced microprocessor design optimizes power consumption, allowing a 20% energy reduction compared to other sensors.

### Simplified setup
Distance and sensing functions are easily set via the teach button or the remote teach wire on the PD30 ADVANCED sensors and via the freely adjustable potentiometer on the PD30 BASIC sensors, the PD30 *PointSpot* sensors and the PD30 Stainless steel sensors.

### Space optimization
Despite its small size, PD30 offers the longest sensing range, managing distances formerly reached only by larger sensors.

### Tamper-proof (PD30 Advanced series)
Connecting the remote teach wire to the power supply disables the push button and makes the sensor tamper-proof.

### Diagnostic warning (PD30 Advanced series)
Two options are available: a 'dust output' that monitors the sensing performance and sends a signal if the sensor gets dirty, and a 'mute input' that allows a PLC to check the application for proper sensing operations.

### Approvals
CE (EN60947-5-2)
cULus (UL508)

*) Only stainlees steel

**Sensors**      CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.

## PD30 Stainless Steel

The PD30 Stainless Steel sensor family is designed for use in harsh or hygienic environments. Built of excellent materials, the housing is resistant to high-pressure washdown, aggressive cleaning agents, and disinfectants. The sturdy stainless steel housing (AISI316L) together with high-quality plastic materials like PEEK, PPSU, and PES sealings of FKM guarantee an outstanding mechanical resistance.
IP69K and Ecolab certified, these stainless steel sensors superiorly meet the demands of the food and beverage industry.

## PD30 Advanced

Sensitivity adjustment is accessible and highly flexible due to the teach-in and remote teach functions offered by the PD30 Advanced sensor series. Using the remote teach function, the operator can set the sensor from a PLC.
Furthermore, the Advanced series features dust warning and mute input, ensuring that sensor malfunctions are timely detected, and costly machine downtime is avoided.
The Advanced series offers detection of transparent objects such as PET bottles.

## PD30 Basic

The PD30 Basic sensor family presents a range of general-purpose sensors: economical, yet highly efficient!
These sensors feature top or back potentiometer for sensitivity adjustment as well as background suppression (BGS) based on a brand-new sensing principle which considerably increases the sensing distance (200 mm) and improves the detection accuracy of different colours.

## PD30 *PointSpot*

The PD30 Basic sensor family includes a *PointSpot* version with a visible, small and precise red beam of light. The *PointSpot* emitter sends out a more concentrated light resulting in a clear-cut light spot without any surrounding halo light to disturb the detection. The *PointSpot* sensors enable detection with precise accuracy.

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.

**Sensors**    3

## Miniature photoelectric sensors

**Product types**

### Through-Beam

Separate emitter and receiver in a separate housing. A sensing distance of 15 m enables the sensor to be used in industrial settings where reliable detection is of primary importance. With a powerful infrared light beam, the sensor can see through various materials and determine whether content is present or not.
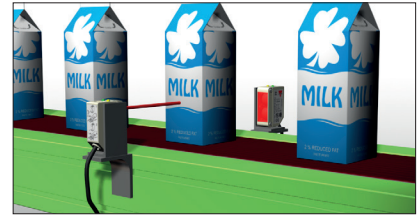


### Retro-Reflective and Polarized Reflective

Emitter and receiver in one and the same housing. The signal from the emitter is sent to a reflector/passive device, and the need for wiring is reduced to one side of the application. The infrared retro-reflective sensor is primarily used in applications where the light beam must be invisible - for instance in entrance systems/doorways. The polarized reflective sensors are also able to detect objects with bright shiny surfaces.
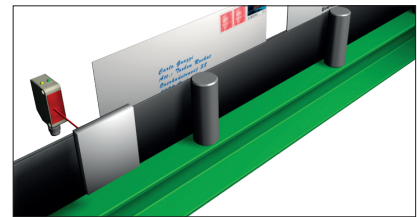


### Retro-Reflective *PointSpot*

Emitter and receiver in one and the same housing. The signal from the emitter is sent to a reflector/passive device, and the need for wiring is reduced to one side of the application. The retro-reflective *PointSpot* sensor emits a highly visible and well-defined light spot without any disturbing "halo".
The polarized reflective sensors are also able to detect objects with bright shiny surfaces.
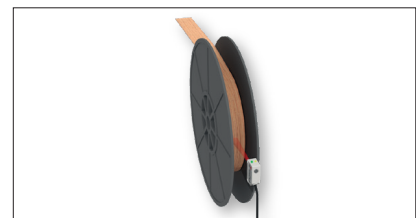


### Retro-Reflective for transparent objects

Like retro-reflective sensors - but optimised to detect transparent objects such as PET bottles. The PD30 sensor features a long-range version suitable for supervising the jamming zone on both narrow and wide conveyor belts.
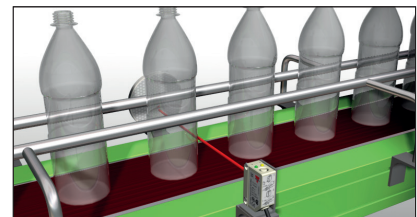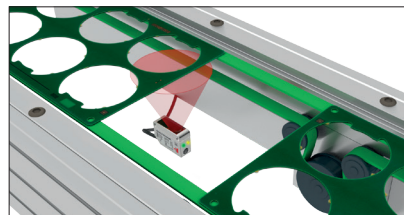


### Diffuse-Reflective

Emitter and receiver in one and the same housing. A diffuse-reflective sensor without background suppression measures only energy returned from objects, which makes it ideal for structured surfaces because the sensor detects an average amount of light reflected.
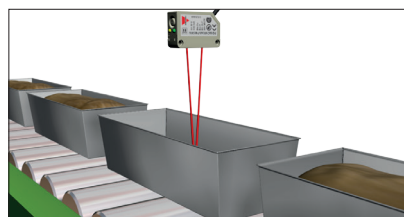
**Sensors**

### Diffuse-Reflective - Extremely wide-angle

Emitter and receiver in one and the same housing. The diffuse-reflective sensor with an extremely wide detection angle can be used to detect PCBs despite large holes in the board, which means the PCB is registered as one PCB in the product cycle.

### Background Suppression

A background suppression sensor detects an object using triangulation. Unlike a diffuse-reflective sensor, it is not colour-sensitive and is, therefore, capable of detecting a black object in front of, for instance, a white background.

### Background Suppression *PointSpot*

A background suppression sensor detects an object using triangulation. The background suppression PointSpot sensor has an excellent colour variation suppression (same distance on all colours). In addition, the *PointSpot* sensor emits no disturbing halo light but produces a well-defined, visible light spot.
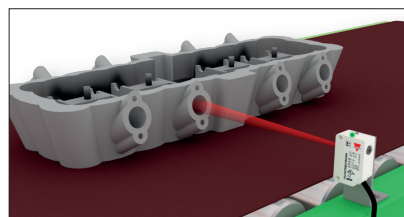
## General features and functions

## Electrical and optical design

### PD30 standard

An optimised aspherical lens design allows for both a wide sensing angle and a long sensing range.
A PCB 'sandwich construction' together with microprocessor technology and a robust, functional analogue design provide optimised sensing and EMC performances, exceeding requirements from IEC. PD30 is a sensor optimised for industrial environments!
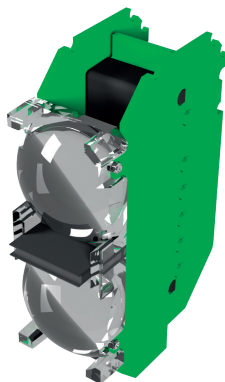
### PD30 *PointSpot*

An optimised lens holder and lens design that generates the *PointSpot* light beam and eliminates the halo light for a precise and well-defined detection performance.
Micro-processor techniques featuring control of the emitter pulses, detection, signal filtration, synchronisation, LED indication control as well as the output and short-circuited detection. The sensitive parts of the sensor are shielded with a metal casing to achieve the best EMC performances. A sensor optimised for Industrial automation.

## Miniature photoelectric sensors

### PD30 Stainless Steel - features and functions

**Waterproof sealings**
Flourelastomer (FKM)

**Housing and clips**
AISI316L High-grade stainless steel

**Front glass**
Polyphenylene sulfide (PPSU) or Polymethyl methacrylate (PMMA) organosiloxane-coated

**Large lens**
ensures long sensing range

**4-pin M8 plug connector**
to meet most connection requirements

**Indicator cover**
Polyethersulfone (PES)

**Yellow LED**
Target detected

**Built-in mounting holes**
2 x M3 for fast mounting
Spacing: 25.4 mm (1")

**Sensitivity trimmer shaft**
Polyetheretherketone (PEEK)

**Green LED**
Power supply and signal stability

**Laser markings**
for better hygiene

**Waterproof sealings**

**4-wire PVC cable**
Ø3.3 mm to meet most connection requirements

### PD30 Stainless Steel - benefits
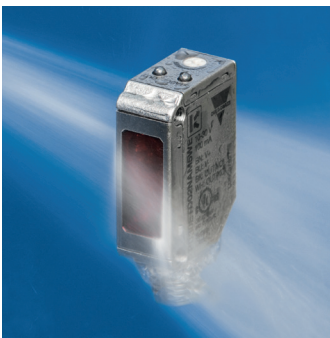
**Highest degree of protection**

The IP69K rating is for applications where high pressure and high temperature wash-down is used to sanitize equipment.

The PD30 Stainless steel housing withstands high-pressure cleaning processes with chemicals, and the sensor's object detection is continuous and reliable even in the harshest conditions. Certified by Ecolab.

| Tolerates | Description of application | Concentration | Load duration | Result |
|---|---|---|---|---|
| Topax 56 | Acidic foam cleaner for the food industry | 5% | 240 hours at 50°C | Passed |
| P3 Hypochloran | Chlorine-containing disinfectant for the food industry | 1% | 240 hours at 24°C | Passed |
| TOPAZ CL1 | Alkaline and chlorine-containing foam cleaner for the food industry | 5% | 240 hours at 50°C | Passed |
| TOPAZ AC1 | Acidic foam cleaner for the food industry | 4% | 240 hours at 50°C | Passed |
| TOPAZ MD3 | Alkaline foam cleaner for the food industry | 5% | 240 hours at 50°C | Passed |
| P3-topactive OKTO | Acidic foam disinfectant for the food industry | 1% | 240 hours at 24°C | Passed |

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.

## PD30 Stainless Steel - specifications

| PD30ET.. | | Background suppression | | Retro-reflective | | Diffuse-reflective | | Through-beam | |
|---|---|---|---|---|---|---|---|---|---|
| | | Reflective | Reflective with IR light | Standard | With Polarization filter | Standard | Extremely Wide Angle | Receiver | Emitter |
| Cable | NPN | ..B20NASA | ..B20NAIS | ..R60NASA | ..P60NASA | ..D10NASA | ..D02NAWE | ..T15NASA | ..T15 |
| | PNP | ..B20PASA | ..B20PAIS | ..R60PASA | ..P60PASA | ..D10PASA | ..D02PAWE | ..T15PASA | |
| Plug | NPN | ..B20NAM5SA | ..B20NAM5IS | ..R60NAM5SA | ..P60NAM5SA | ..D10NAM5SA | ..D02NAM5WE | ..T15NAM5SA | ..T15M5 |
| | PNP | ..B20PAM5SA | ..B20PAM5IS | ..R60PAM5SA | ..P60PAM5SA | ..D10PAM5SA | ..D02PAM5WE | ..T15PAM5SA | |
| Rated operating distance ($S_n$) | | 200 mm (7.9 inches) | | 6 m ER4 reflector 4 m ER4060 reflector | | 1 m | 200 mm | 15 m (49.2 feet) | |
| Hysteresis (H) | | ≤ 10% | | 5% to 20% | | | | - | |
| Rated operational voltage | | 10 to 30 V DC (Ripple included) | | | | | | | |
| No load supply current ($I_o$) | | ≤ 40 mA @ $U_B$ max. ≤ 20 mA @ $U_B$ min. | | ≤ 25 mA @ $U_B$ max. | | | | ≤ 20mA @ $U_B$ max. | |
| Output | | Open collector, NPN or PNP by sensor type | | | | | | - | |
| Output function | | N.O. (light switching) and N.C. (dark switching) | | | | | | - | |
| Output current | | ≤ 100 mA (max. load capacity 100 nF) | | | | | | - | |
| Minimum operational current ($I_m$) | | ≤ 0,5 mA | | | | | | - | |
| Off-State current ($I_r$) | | ≤ 100 µA | | | | | | - | |
| Voltage drop ($U_d$) | | ≤ 2 VDC @ ($I_e$) max. | | | | | | - | |
| Sensor protection | | Short circuit (A), reverse polarity (B) and transients (C) | | | | | | B + C | |
| Response time | | ≤ 1.0 ms | | ≤ 0.5 ms | | | | ≤ 1.0 ms | - |
| Power on delay ($t_v$) | | ≤ 200 ms | | ≤ 30 ms | | | | ≤ 200 ms | ≤ 30 ms |
| Led indications | | Target detected (Yellow LED), Signal stability and Power ON (Green LED) | | | | | | | Power ON |
| Sensitivity control | | Potentiometer, 210° electric, integrated in the receiver for through-beam type | | | | | | | |
| Degree of protection | | IP68 @ 2 m and 20 h (IEC 60539; EN60947-1), IP69K (DIN40050-9) | | | | | | | |
| Ambient temperature | | Operating: -25 to +60°C (-13 to +140°F) Storage: -40 to +70°C (-40 to +158°F ) | | Operating cable version: -25 to +60°C (-13 to +140°F) Operating plug version: -40 to +60°C (-40 to +140°F) Storage: -40 to +70°C (-40 to +158°F ) | | | | | |
| Ambient humidity | | Operating: 35 to 95 % RH, Storage: 35 to 95 % RH | | | | | | | |
| Ambient light | | ≤ 45 000 Lux | ≤ 65 000 Lux | | | ≤ 10 000 Lux | | ≤ 65 000 Lux | |
| CE marking | | According to EN 60947-5-2 | | | | | | | |
| Approvals | | cULus (UL508, CSA C22.2), ECOLAB | | | | | | | |
| Installation category | | III (IEC60664; EN60947-1) | | | | | | | |
| Pollution degree | | 3(EN60947-1) | | | | | | | |
| Vibration | | 10 to 150 Hz (1.0 mm/15 g; (EN 60068-2-6) in X,Y and Z direction | | | | | | | |
| Shock | | 30 g /11 ms. 6 positive and 6 negative in X,Y and Z direction | | | | | | | |
| Light source | | 617 nm | 850 nm | 625 nm | | 617 nm | | - | 850 nm |
| Light type | | Red modulated | Infrared modulated | Red modulated | | | | - | Infrared modulated |
| Material | | Body: Stainless steel, AISI316L; Front glass: Polyphenylene sulfide (PPSU) or Polymethyl methacrylate (PMMA) organosiloxane-coated; Trimmer shaft: Polyetheretherketone (PEEK) | | | | | | | |
| Cable | | PVC, black, 2 m, 4 x 0.14mm², Ø=3.3 mm | | | | | | | |
| Connector | | 4-pin M8, male | | | | | | | |
| Dimensions | | 11 x 31.5 x 21 mm | | | | | | | |
| Weight incl. packaging | | Cable version ≤ 100 g, Plug version ≤ 65 g | | | | | | | |
| Accessories (to be purchased seperately) | | Mounting bracket: APD30-MB1 or APD30-MB2 Connectors: CO..54NF... series | | | | | | | |

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.

Sensors

7

# PD30 Series
## Miniature photoelectric sensors

## PD30 Advanced - features and functions

**Yellow LED**
Target detected

**Green LED**
Power supply and signal stability

**Indicator cover**
Polyethersulfone (PES)

**Housing**
Akrylonitril-butadien-styren (ABS)

**Teach-in button**
- Distance setting
- Sensing overhead
- Normally open/ Normally closed teach -in
- Setup while in operation

**Front glass**
Polymethyl methacrylate (PMMA) SI-coated

**Large lens**
ensures long sensing range

**4-pin M8 plug connector**
to meet most connection requirements

**Built-in mounting holes**
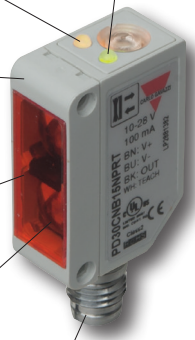2 x M3 for fast mounting
Spacing: 25.4 mm (1")

**4-wire PVC cable**
Ø 3.3 mm to meet most connection requirements

## PD30 Advanced - benefits

### Mute function (sensor blanking)

When more than one set of through-beam sensors are mounted close to each other, mutual interference might occur. Controlling the mute function - for instance from a PLC - can form a multiplex system where only one set of sensors is active at a time and neighbouring interference is avoided. The mute function is also used to check the sensor for malfunctions or disconnections. If the emitter is turned on and off periodically, any malfunction will be detected as early as possible and costly breakdowns are prevented.
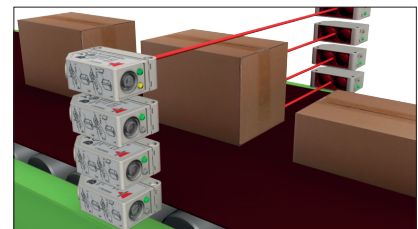
### Half mute function (> 3 sec.)

When manually aligned sensors are used over a long distance, condensation or dust can cause false signals. Activating the half mute function (> 3 sec.) will set the emitter at half power. Aligning the sensor at half power ensures enough energy to make the sensor function properly when switching back to full power.
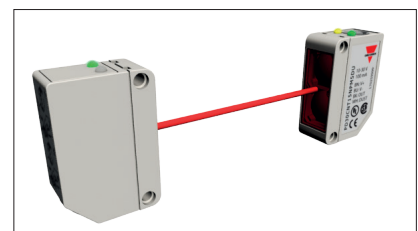
### Dust alarm output

To prevent downtime of machinery, sensors have to be kept clean when used in dirty or dusty environments. The sensor will send an alarm signal over the dust output if it receives a low-level signal for more than 20 ms. As a result, operators will know exactly when to clean the sensor, and sensors are cleaned only when necessary.
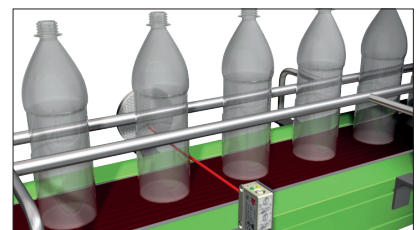
### Remote teaching

Detection of diverse objects may require frequent modification of the sensor's settings such as distance and sensing overheads. A PLC connected to the remote teach input enables the operator to change the sensor's settings while in operation. The teaching procedure is identical to the one used for manual teaching via the teach button.

## Sensors
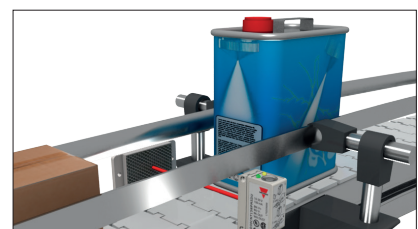
# PD30 Advanced - specifications

| PD30CN.. | | | Diffuse-reflective | | Retro-reflective | | | Through-beam | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Background suppression | Energetic | Standard | With Polarization filter | For Transparent Objects | Receiver | Emitter |
| Cable | NPN | Remote teach | ..B15NPRT | ..D10NPRT | ..R06NPRT | ..P06NPRT | ..G02NPRT | ..T15NPRT | - |
| | | Dust alarm | - | ..D10NPDU | ..R06NPDU | ..P06NPDU | - | ..T15NPDU | - |
| | | Mute function | - | - | ..R06NPMU | ..P06NPMU | ..G02NPMU | - | ..T15NMU |
| | PNP | Remote teach | ..B15PPRT | ..D10PPRT | ..R06PPRT | ..P06PPRT | ..G02PPRT | ..T15PPRT | - |
| | | Dust alarm | - | ..D10PPDU | ..R06PPDU | ..P06PPDU | - | ..T15PPDU | - |
| | | Mute function | - | - | ..R06PPMU | ..P06PPMU | ..G02PPMU | - | ..T15PMU |
| Plug | NPN | Remote teach | ..B15NPM5RT | ..D10NPM5RT | ..R06NPM5RT | ..P06NPM5RT | ..G02NPM5RT | ..T15NPM5RT | - |
| | | Dust alarm | - | ..D10NPM5DU | ..R06NPM5DU | ..P06NPM5DU | - | ..T15NPM5DU | - |
| | | Mute function | - | - | ..R06NPM5MU | ..P06NPM5MU | ..G02NPM5MU | - | ..T15NM5MU |
| | PNP | Remote teach | ..B15PPM5RT | ..D10PPM5RT | ..R06PPM5RT | ..P06PPM5RT | ..G02PPM5RT | ..T15PPM5RT | - |
| | | Dust alarm | - | ..D10PPM5DU | ..R06PPM5DU | ..P06PPM5DU | - | ..T15PPM5DU | - |
| | | Mute function | - | - | ..R06PPM5MU | ..P06PPM5MU | ..G02PPM5MU | - | ..T15PM5MU |
| Rated operating distance ($S_n$) | | | 150 mm 5.9 inches | 1 m 3.3 feet | 6 m 9.8 feet | 6 m 9.8 feet | 2 m 6.6 feet | 15 m 49.2 feet | |
| Hysteresis (H) | | | ≤ 10% | | | | | - | |
| Rated operational voltage | | | 10 to 30 V DC, Ripple P-P ≤ 10% | | | | | | |
| No load supply current ($I_o$) | | | ≤ 32 mA @ 24 V DC | ≤ 30 mA @ 24 V DC | | | | ≤ 30mA | ≤ 25mA |
| Output | | | Open collector, NPN or PNP by sensor type | | | | | - | |
| Output function | | | N.O. (light switching) or N.C. (dark switching) | | | | | - | |
| Output current ($I_e$) | | | ≤ 100 mA (max. Load capacity 100 nF) | | | | | - | |
| Minimum operational current | | | ≤ 0,5 mA | | | | | - | |
| Off-State current ($I_r$) | | | ≤ 100 µA | | | | | - | |
| Voltage drop ($U_d$) | | | ≤ 2.5 V DC @ 100 mA | | | | | - | |
| Sensor protection | | | Short circuit (A), reverse polarity (B) and transients (C) | | | | | B + C | |
| Response time | | | ≤ 0,5 mS | | | | | - | |
| Power on delay ($t_v$) | | | ≤ 400 mS | ≤ 300 mS | | | | | |
| Led indications | | | Target detected (Yellow LED), Signal stability and Power ON (Green LED) | | | | | Power ON | |
| Sensitivity control | | | Teach-In programming | | | | | | |
| Degree of protection | | | IP67 (IEC 60529; 60947-1) | | | | | | |
| Ambient temperature | | | -25 to +55°C (-13 to +131°F) no condensation, Storage -40 to +70°C (-40 to +158°F ) | | | | | | |
| Ambient humidity | | | Operating: 35 to 85 % RH, storage: 35 to 85 % RH | | | | | | |
| Ambient light | | | ≤ 10.000 Lux | | | | | | |
| CE marking | | | According to EN 60947-5-2 | | | | | | |
| Approvals | | | cULus (UL508, CSA C22.2) | | | | | | |
| Installation category | | | III (IEC60664/60664A; 60947-1) | | | | | | |
| Pollution degree | | | 3(IEC60664/60664A; 60947-1) | | | | | | |
| Vibration | | | 10 to 150 Hz (1.0 mm/15 g; IEC 60068-2-6) in X,Y and Z direction | | | | | | |
| Shock | | | 30 g /11 ms. 3 positive and 3 negative in X,Y and Z direction | | | | | | |
| Emitting light source | | | Red LED | Infrared LED | Red LED | | - | | Infrared LED |
| Material | | | Body, ABS light grey; Front glass, PMMA red; Trimmer shaft, POM dark grey | | | | | | |
| Cable | | | PVC, black, 2 m, 4 x 0.14mm², Ø=3.3 mm | | | | | | |
| Connector | | | 4-pin M8 | | | | | | |
| Dimensions | | | 10.8 x 20 x 30 mm | | | | | | |
| Weight incl. packaging | | | Cable version ≤ 40 g, Plug version ≤ 10 g | | | | | | |
| Accessories | | | Mounting bracket: APD30-MB1 | | | | | | |
| Accessories, additional | | | 'Mounting bracket: APD30-MB2 Connectors: CONM54NF-... Types' | | | | | | |

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.

Sensors

9

# PD30 Series
## Miniature photoelectric sensors

## PD30 *PointSpot* - features and functions

**Yellow LED**
Target detected

**Green LED**
Power supply and
signal stability

**Housing**
Akrylonitril-butadien-
styren (ABS)

**Front glass**
Polymethyl methacrylate
(PMMA) SI-coated

**Large lens**
ensures long
sensing range

**4-pin M8 plug connector**
to meet most connection
requirements

**Indicator cover**
Thermoplastic polyurethane
(TPU)

**Sensitivity shaft**
Polyoxymethylen, acetal
(POM)

**Potentiometer**
- Manual setting
- Larger adjustability
- Easily set distance
- Back or top

**Built-in mounting holes**
2 x M3 for fast mounting
Spacing: 25.4 mm (1")

**4-wire PVC cable**
Ø 3.3 mm to meet most
connection requirements

## PD30 *PointSpot* - principle

Object beyond the
background distance

Halo

Primary
beam

Adjusted background
distance
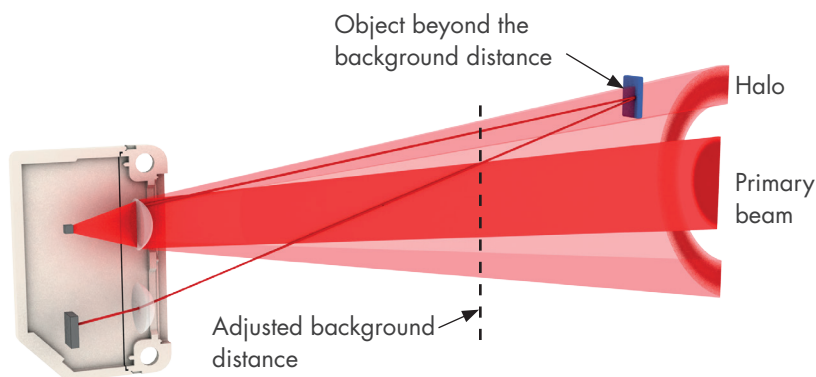
**PD30 with *standard* emitter**
An object with a high reflection placed
within the light beam's halo but outside
the primary light beam may cause an
erroneous detection because the re-
flected light will hit the exact same spot
on the receiver array.

Object beyond the
background distance

Adjusted background
distance
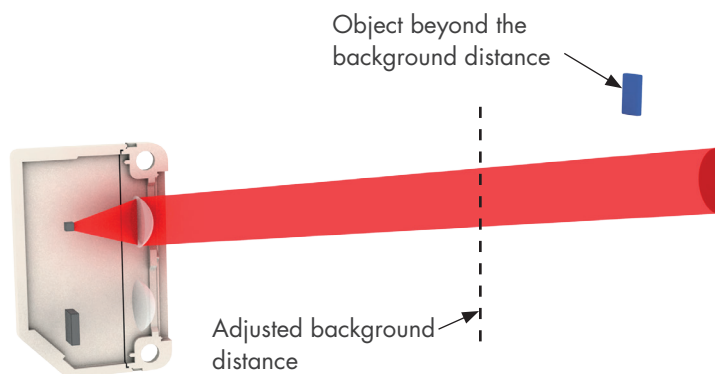
**PD30 with *PointSpot* emitter**
As the *PointSpot* light has no halo, any
object outside the primary beam will
not be detected.

**Sensors**

## PD30 *PointSpot* - specifications

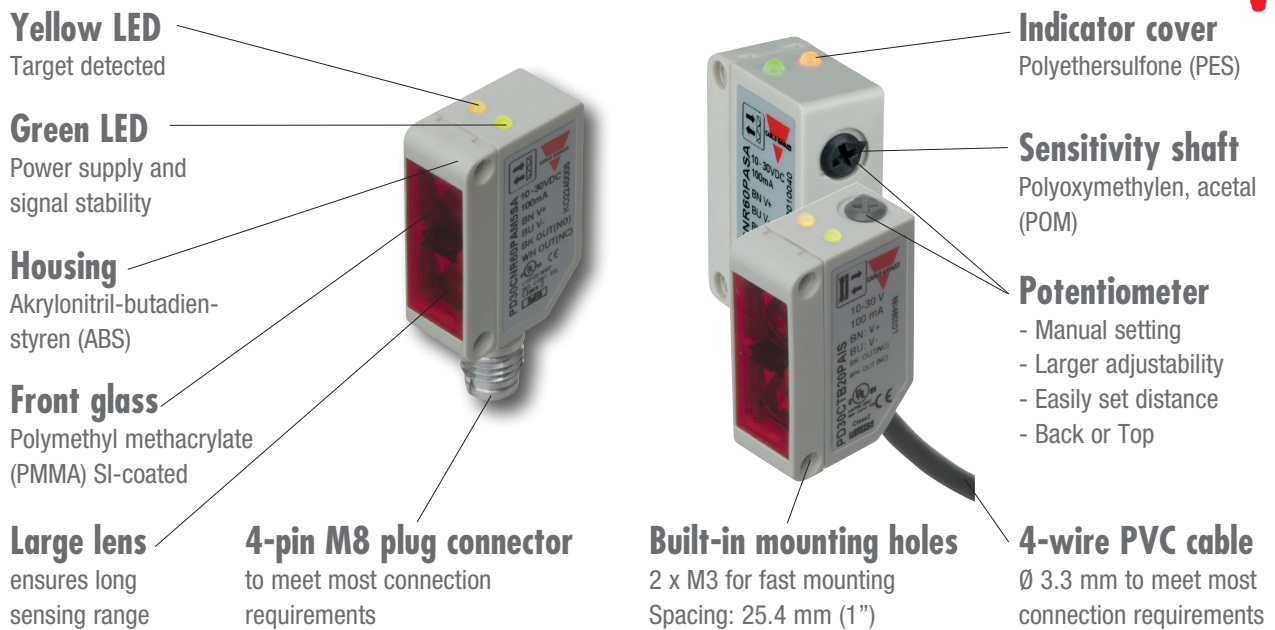| PD30C... | | Reflective | Retro-reflective |
|---|---|---|---|
| | | Background suppression | With Polarization filter |
| Cable | NPN | ..CNB25NAPS | ..CNP50NAPS |
| | PNP | ..CNB25PAPS | ..CNP50PAPS |
| Plug | NPN | ..CNB25NAM5PS | ..CNP50NAM5PS |
| | PNP | ..CNB25PAM5PS | ..CNP50PAM5PS |
| Rated operating distance ($S_n$) | | ≤ 250 mm ≤ 9.8 inches | ≤ 5 m (16.4 feet) with reflector ER4, ≤ 3 m (9.8 feet) with reflector ER4060 |
| Emitter angle | | ±1.6° @ 100 mm | ±1.0° @ 1/2 sensing distance |
| Hysteresis (H) | | ≤ 10% | 3% ... 20% |
| Rated operational voltage | | 10 to 30 V DC (Ripple included) | |
| No load supply current ($I_o$) | | ≤ 50 mA @ $U_B$ min ≤ 20 mA @ $U_B$ max | ≤ 25 mA @ $U_B$ max |
| Output | | Open collector, NPN or PNP by sensor type | |
| Output function | | N.O. and N.C. | |
| Output current ($I_e$) | | <100 mA (Continuous), ≤ 100 mA @ 100 nF load (Short time) | |
| Minimum operational current | | 0.5 mA | |
| Off-State current ($I_r$) | | 100 µA | |
| Voltage drop ($U_d$) | | ≤ 2 VDC @ $I_e$ max. | |
| Sensor protection | | Short circuit (A), reverse polarity (B) and transients (C) | |
| Response time | | ≤ 1.0 ms | ≤ 0.5 ms |
| Power on delay ($t_v$) | | ≤ 200 ms | ≤ 30 ms |
| Led indications | | Target detected (Yellow LED), Signal stability and Power ON (Green LED) | |
| Sensitivity control | | Single-turn potentiometer, 210° electrical adjustment, 240° mechanical adjustment | |
| Degree of protection | | IP67 (IEC60539; EN60947-1) | |
| Ambient temperature | | -25 to +60 °C (-13 to +140 °F) no condensation, storage -40 to +70 °C (-40 to +158 °F ) | |
| Ambient humidity | | Operating: 35 to 95 % RH, Storage: 35 to 95 % RH | |
| Ambient light | | ≤ 45 000 Lux | |
| CE marking | | According to EN 60947-5-2 | |
| Approvals | | cULus (UL508, CSA C22.2) | |
| Installation category | | III (EN60947-1) | |
| Pollution degree | | 3 (IEC60664; EN60947-1) | |
| Vibration | | 10 to 150 Hz (1.0 mm/15 g; EN60068-2-6) in X,Y and Z direction | |
| Shock | | 30 g /11 ms (6 positive and 6 negative; EN60068-2-27) in X,Y and Z direction | |
| Light source | | 621 nm, Red *PointSpot* | |
| Material | | Body, ABS light grey; Front glass, PMMA red; Trimmer shaft, POM dark grey | |
| Cable | | PVC, black, 2 m, 4 x 0.14mm², Ø=3.3 mm | |
| Connector | | 4-pin M8 | |
| Dimensions | | 10.8 x 20 x 30 mm | |
| Weight incl. packaging | | Cable version ≤ 50 g, Plug version ≤ 20 g | |

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.

**Sensors** 11

# Miniature photoelectric sensors

## PD30 Basic - features and functions

**Yellow LED**
Target detected

**Green LED**
Power supply and
signal stability

**Housing**
Akrylonitril-butadien-
styren (ABS)

**Front glass**
Polymethyl methacrylate
(PMMA) SI-coated

**Large lens**
ensures long
sensing range

**4-pin M8 plug connector**
to meet most connection
requirements

**Indicator cover**
Polyethersulfone (PES)

**Sensitivity shaft**
Polyoxymethylen, acetal
(POM)

**Potentiometer**
- Manual setting
- Larger adjustability
- Easily set distance
- Back or Top

**Built-in mounting holes**
2 x M3 for fast mounting
Spacing: 25.4 mm (1")

**4-wire PVC cable**
Ø 3.3 mm to meet most
connection requirements

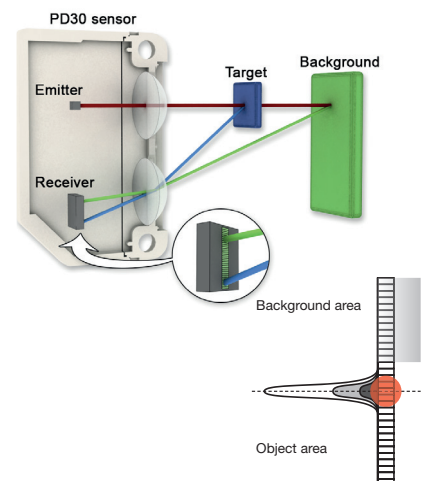## PD30 Basic and Stainless Steel - new background suppression principle

The new PD30 Stainless Steel and BASIC background suppression sensor (BGS) is based on a brand-new sensing principle. This principle increases the sensing distance considerably (200 mm) and it improves the detection accuracy of different colours, suppressing the background even more efficiently.

This revolutionary sensing technology uses an Active Pixel Sensor (APS) CMOS array of 64 x 1 sensors, where each pixel represents a specific position. It takes advantage of the fact that the reflected light hits the APS array at exactly the same position.

This way, the object's mass centre can be found regardless of the energy of the received light. Using this technology, grey, black and white objects are detected at almost exactly the same distance.

Furthermore, unlike traditional CCD arrays, the CMOS array benefits from being immune to the blooming effect - not letting the light bleed onto other pixels and disturbing the detection.

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.

## PD30 Basic - specifications

| PD30C... | | | Diffuse-reflective | | | | Retro-reflective | | Through-beam | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Background suppression | Energetic | Energetic Extreme Wide Angle | | Standard | With Polarization filter | Receiver | Emitter |
| **Back Potentiometer** | Cable | NPN | ..NB20NASA | ..NB20NAIS | ..ND10NASA | - | ..NR60NASA | ..NP60NASA | ..NT15NASA | ..NT15 |
| | | PNP | ..NB20PASA | ..NB20PAIS | ..ND10PASA | - | ..NR60PASA | ..NP60PASA | ..NT15PASA | |
| | Plug | NPN | ..NB20NAM5SA | ..NB20NAM5IS | ..ND10NAM5SA | - | ..NR60NAM5SA | ..NP60NAM5SA | ..NT15NAM5SA | ..NT15M5 |
| | | PNP | ..NB20PAM5SA | ..NB20PAM5IS | ..ND10PAM5SA | - | ..NR60PAM5SA | ..NP60PAM5SA | ..NT15PAM5SA | |
| **Top Potentiometer** | Cable | NPN | ..TB20NASA | ..TB20NAIS | ..TD10NASA | ..TD02NAWE | - | - | - | - |
| | | PNP | ..TB20PASA | ..TB20PAIS | ..TD10PASA | ..TD02PAWE | - | - | - | - |
| Rated operating distance ($S_n$) | | | 200 mm 7.9 inches | | 1 m 3.3 feet | 200 mm 7.9 inches | 6 m 9.8 feet | 6 m 9.8 feet | 15 m 49.2 feet | |
| Emitter angle @ 1/2 distance | | | ±2.5° | ±1.5° | ±2.0° | ±15° | ±2.0° | | - | ±2.0° |
| Hysteresis (H) | | | ≤ 10% | | | | 5% TO 20% | | < 10% | - |
| Rated operational voltage | | | 10 to 30 V DC, Ripple P-P ≤ 10% | | | | | | | |
| No load supply current ($I_o$) | | | ≤ 30 mA @ $U_B$ min ≤ 20 mA @ $U_B$ max | | ≤ 25 mA | | | | | ≤ 20mA |
| Output | | | Open collector, NPN or PNP by sensor type | | | | | | | - |
| Output function | | | N.O. (light switching) and N.C. (dark switching) | | | | | | | - |
| Output current ($I_e$) | | | ≤ 100 mA (max. load capacity 100 nF) | | | | | | | - |
| Minimum operational current | | | ≤ 0,5 mA | | | | | | | - |
| Off-State current ($I_r$) | | | ≤ 100 µA | | | | | | | - |
| Voltage drop ($U_d$) | | | ≤ 2 V DC @ $I_e$ max | | | | | | | - |
| Sensor protection | | | Short circuit (A), reverse polarity (B) and transients (C) | | | | | | | B + C |
| Response time | | | ≤ 1 mS | | ≤ 0.5 mS | | | | ≤ 1 mS | - |
| Power on delay ($t_v$) | | | ≤ 200 mS | | | | | | | |
| Led indications | | | Target detected (Yellow LED), Signal stability and Power ON (Green LED) | | | | | | | Power ON |
| Sensitivity control | | | Potentiometer, 210° electric, integrated in the receiver for through-beam type | | | | | | | |
| Degree of protection | | | IP67 (Iec 60529; 60947-1) | | | | | | | |
| Ambient temperature | | | -25 to +60 °C (-13 to +140 °F) no condensation, storage -40 to +70 °C (-40 to +158 °F ) | | | | | | | |
| Ambient humidity | | | Operating: 35 to 85 % RH, storage: 35 to 85 % RH | | | | | | | |
| Ambient light | | | ≤ 10.000 Lux | | | | | | | |
| CE marking | | | According to EN 60947-5-2 | | | | | | | |
| Approvals | | | cULus (UL508, CSA C22.2) | | | | | | | |
| Installation category | | | III (IEC60664/60664A; 60947-1) | | | | | | | |
| Pollution degree | | | 3(IEC60664/60664A; 60947-1) | | | | | | | |
| Vibration | | | 10 to 150 Hz (1.0 mm/15 g; IEC 60068-2-6) in X,Y and Z direction | | | | | | | |
| Shock | | | 30 g /11 ms, 3 positive and 3 negative in X,Y and Z direction | | | | | | | |
| Emitting light source | | | Red Led | Infrared LED | Red LED | Infrared LED | Infrared LED | Red LED | - | Infrared LED |
| Material | | | Body, ABS light grey; Front glass, PMMA red; Trimmer shaft, POM dark grey | | | | | | | |
| Cable | | | Pcv, black, 2 m, 4 x 0.14mm², Ø=3.3 mm | | | | | | | |
| Connector | | | 4-pin M8 | | | | | | | |
| Dimensions | | | 10.8 x 20 x 30 mm | | | | | | | |
| Weight incl. packaging | | | Cable version ≤ 50 g, Plug version ≤ 20 g | | | | | | | |

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.

**Sensors** 13

# Miniature photoelectric sensors

## Applications

### Meat, fish and poultry

The food industry's high demands on hygiene and cleanliness require equipment that can withstand daily washdown at high temperatures, high-pressure cleaning and harsh detergents.

**Our solution**
The PD30 Stainless steel sensors work perfectly even in the harshest environments. The high-quality stainless steel housing guarantees maximum mechanical resistance, and prescribed cleaning schedules are smoothly met without costly machine downtime.

### Dairy and juice production

Multi-coloured cartons used in the dairy and juice industries constitute a significant challenge to object detection in the manufacturing process. For example in the production lines of yoghurt cups, the presence of lids on the cups must be detected and it is essential that lids are not confused with yoghurt in the cups.

**Our solution**
Our PD30 background suppression sensor superiorly detects all colours on objects in the same distance from the sensor, and its durable design withstands daily cleaning processes including high-pressure water jets (IP69K)as well as aggressive cleaning agents.

### Food handling and packaging

Typically, packaging lines and production lines in the food industry are not subject to the same stringent requirements. For convenience and simplicity, however, the trend is towards identical cleaning procedures throughout.

**Our solution**
The PD30 Stainless steel sensors are designed for wet as well as dry areas in the Food and Beverage industry. The stainless steel housing and high-end plastic materials guarantee maximum resistance against IP69K and Ecolab cleaning processes. As a consequence, cleaning routines and instructions are kept homogenous and clearly defined all over the plant.

### Printed circuit board manufacturing

In the PCB Industry considerable problems can arise when it comes to detecting black components on a PCB.

**Our solution**
The PD30 background suppression sensor is positioned below the PCBs which are detected when passing. Since background suppression is based on triangulation, component colours will not affect the detection. To protect operators on the assembly line from being blinded by an upwardly directed sensor, the infrared PD30 sensor is the obvious choice.
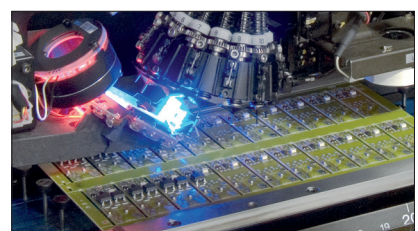
## Sensors

## Coffee vending machines

In vending machines sensors often confuse cups and backgrounds such as a person drawing a cup of coffee.

**Our solution**
The PD30 background suppression sensor enhances the overall ease of use of the vending machine. Using the new BGS technology, it can detect cups in different colours equally well and, at the same time, ignore people and irrelevant background noise in front of the machine.

## End of material detection

End of spool detection of material supplied in narrow cassettes can be done using distance measurement. The sides of the cassette, however, can pose a problem because they are so tight that they might influence the detection.

**Our solution**
The PD30 sensor with *PointSpot* beam and background suppression ensures an absolutely precise detection which is not influenced by colour or reflections from the sides of the cassette.
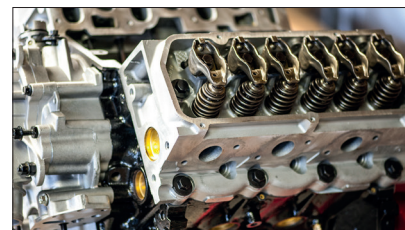
## Inspection control

An engine block must be examined to make sure that all the holes are present.

**Our solution**
Our PD30 background suppression sensor with its red visible *PointSpot* light can detect even tiny holes because of the small beam diameter. Furthermore, since the *PointSpot* emitter produces no halo lidht, the surrounding parts of the hole are not unintentionally exposed to detection. Adjustment is easy due to the visible *PointSpot* beam.

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.

**Sensors** 15

## OUR SALES NETWORK IN EUROPE

**AUSTRIA**
Carlo Gavazzi GmbH
Ketzergasse 374,
A-1230 Wien
Tel: +43 1 888 4112
Fax: +43 1 889 10 53
office@carlogavazzi.at

**BELGIUM**
Carlo Gavazzi NV/SA
Mechelsesteenweg 311,
B-1800 Vilvoorde
Tel: +32 2 257 4120
Fax: +32 2 257 41 25
sales@carlogavazzi.be

**DENMARK**
Carlo Gavazzi Handel A/S
Over Hadstenvej 40,
DK-8370 Hadsten
Tel: +45 89 60 6100
Fax: +45 86 98 15 30
handel@gavazzi.dk

**FINLAND**
Carlo Gavazzi OY AB
Ahventie 4 B,
FI-02170 Espoo
Tel: +358 9 756 2000
myynti@gavazzi.fi

**FRANCE**
Carlo Gavazzi Sarl
Zac de Paris Nord II, 69, rue de la Belle Etoile,
F-95956 Roissy CDG Cedex
Tel: +33 1 49 38 98 60
Fax: +33 1 48 63 27 43
french.team@carlogavazzi.fr

**GERMANY**
Carlo Gavazzi GmbH
Pfnorstr. 10-14
D-64293 Darmstadt
Tel: +49 6151 81000
Fax: +49 6151 81 00 40
info@gavazzi.de

**GREAT BRITAIN**
Carlo Gavazzi UK Ltd
4.4 Frimley Business Park,
Frimley, Camberley, Surrey GU16 7SG
Tel: +44 1 276 854 110
Fax: +44 1 276 682 140
sales@carlogavazzi.co.uk

**ITALY**
Carlo Gavazzi SpA
Via Milano 13,
I-20020 Lainate
Tel: +39 02 931 761
Fax: +39 02 931 763 01
info@gavazziacbu.it

**NETHERLANDS**
Carlo Gavazzi BV
Wijkermeerweg 23,
NL-1948 NT Beverwijk
Tel: +31 251 22 9345
Fax: +31 251 22 60 55
info@carlogavazzi.nl

**NORWAY**
Carlo Gavazzi AS
Melkeveien 13,
N-3919 Porsgrunn
Tel: +47 35 93 0800
Fax: +47 35 93 08 01
post@gavazzi.no

**PORTUGAL**
Carlo Gavazzi Lda
Rua dos Jerónimos 38-B,
P-1400-212 Lisboa
Tel: +351 21 361 7060
Fax: +351 21 362 13 73
carlogavazzi@carlogavazzi.pt

**SPAIN**
Carlo Gavazzi SA
Avda. Iparraguirre, 80-82,
E-48940 Leioa (Bizkaia)
Tel: +34 94 480 4037
Fax: +34 94 431 6081
gavazzi@gavazzi.es

**SWEDEN**
Carlo Gavazzi AB
V:a Kyrkogatan 1,
S-652 24 Karlstad
Tel: +46 54 85 1125
Fax: +46 54 85 11 77
info@carlogavazzi.se

**SWITZERLAND**
Carlo Gavazzi AG
Verkauf Schweiz/Vente Suisse
Sumpfstrasse 3,
CH-6312 Steinhausen
Tel: +41 41 747 4535
Fax: +41 41 740 45 40
info@carlogavazzi.ch

## OUR SALES NETWORK IN THE AMERICAS

**USA**
Carlo Gavazzi Inc.
750 Hastings Lane,
Buffalo Grove, IL 60089, USA
Tel: +1 847 465 6100
Fax: +1 847 465 7373
sales@carlogavazzi.com

**CANADA**
Carlo Gavazzi Inc.
2660 Meadowvale Boulevard,
Mississauga, ON L5N 6M6, Canada
Tel: +1 905 542 0979
Fax: +1 905 542 22 48
gavazzi@carlogavazzi.com

**MEXICO**
Carlo Gavazzi Mexico S.A. de C.V.
Calle La Montaña no. 28, Fracc. Los Pastores
Naucalpan de Juárez, EDOMEX CP 53340
Tel & Fax: +52.55.5373.7042
mexicosales@carlogavazzi.com

**BRAZIL**
Carlo Gavazzi Automação Ltda.Av.
Francisco Matarazzo, 1752
Conj 2108 - Barra Funda - São Paulo/SP
Tel: +55 11 3052 0832
Fax: +55 11 3057 1753
info@carlogavazzi.com.br

## OUR SALES NETWORK IN ASIA AND PACIFIC

**SINGAPORE**
Carlo Gavazzi Automation Singapore Pte. Ltd.
61 Tai Seng Avenue #05-06
Print Media Hub @ Paya Lebar iPark
Singapore 534167
Tel: +65 67 466 990
Fax: +65 67 461 980
info@carlogavazzi.com.sg

**MALAYSIA**
Carlo Gavazzi Automation (M) SDN. BHD.
D12-06-G, Block D12,
Pusat Perdagangan Dana 1,
Jalan PJU 1A/46, 47301 Petaling Jaya,
Selangor, Malaysia.
Tel: +60 3 7842 7299
Fax: +60 3 7842 7399
sales@gavazzi-asia.com

**CHINA**
Carlo Gavazzi Automation
(China) Co. Ltd.
Unit 2308, 23/F.,
News Building, Block 1,1002
Middle Shennan Zhong Road,
Shenzhen, China
Tel: +86 755 83699500
Fax: +86 755 83699300
sales@carlogavazzi.cn

**HONG KONG**
Carlo Gavazzi Automation
Hong Kong Ltd.
Unit 3 12/F Crown Industrial Bldg.,
106 How Ming St., Kwun Tong,
Kowloon, Hong Kong
Tel: +852 23041228
Fax: +852 23443689

## OUR COMPETENCE CENTRES AND PRODUCTION SITES

**DENMARK**
Carlo Gavazzi Industri A/S
Hadsten

**CHINA**
Carlo Gavazzi Automation (Kunshan) Co., Ltd.
Kunshan

**MALTA**
Carlo Gavazzi Ltd
Zejtun

**ITALY**
Carlo Gavazzi Controls SpA
Belluno

**LITHUANIA**
Uab Carlo Gavazzi Industri Kaunas
Kaunas

## HEADQUARTERS

Carlo Gavazzi Automation SpA
Via Milano, 13
I-20020 - Lainate (MI) - ITALY
Tel: +39 02 931 761
info@gavazziautomation.com

Printed on 100% recycled paper
produced using
post consumer de-inked waste.

# CARLO GAVAZZI
Automation Components

*Energy to Components!*

www.gavazziautomation.com

CARLO GAVAZZI